



**US Army Corps
of Engineers®**

Pittsburgh District

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**Draft
Detailed Project Report
And
Integrated Environmental Assessment**

APPENDIX 4

COST ESTIMATES

**North Park Lake
Allegheny County, PA
Section 206 Aquatic Ecosystem
Restoration Project**

Cost Appendix

This appendix includes the screening level cost estimates, a detailed construction cost estimate for the recommended plan, the total project cost estimate, the fully funded cost estimate, and additional cost backup.

Screening Level Cost Estimates

Screening level cost estimates were prepared for three separate alternatives. These alternatives are as follows: Mechanical Sediment Removal – Drain the Lake, Mechanical Sediment Removal – No Lake Drainage, and Hydraulic Dredging.

The screening level estimates included the construction cost associated with removing sediment, trucking and placement of sediment, spreading and compaction of sediment, environmental features, sediment placement site preparation cost, access ramp cost, temporary channel excavation, traffic control issues, plantings, and a wetland protection rock berm. The majority of the cost items, not including the actual dredging and trucking costs were basically similar for the three alternatives.

The screening level cost estimates were developed using several methods. The dredging/trucking/spreading costs were prepared by developing rough crews and production rates. Most of the other costs were developed using historical unit price data. A 25% contingency was added to these screening level costs to account for the limited details available on the design, screening level quantities, and amount of unknowns typical for this level of design. The screening level estimates and their associated backup can be seen later in the appendix under the headings Screening Level Cost Estimates and Screening Level Backup.

Mechanical Sediment Removal – Drain the Lake

This alternative consists of the local sponsor draining the lake prior to turning it over to a contractor. The contractor would then use standard mechanical excavation methods to remove the sediment. Production rates were developed for hydraulic excavators and truck transportation to the sediment placement areas. The cost was developed for excavating and disposing the sediment from different access points to each sediment placement area. To come up with an average cost for excavation and disposal of material, different areas and quantities of excavation were assigned to the different access ramps and placement areas.

Mechanical Sediment Removal – No Lake Drainage

This alternative consists of utilizing mechanical equipment (hydraulic excavator) on work floats to dredge the lake sediment. Rough crews and production rates for the dredging

and trucking of sediment were developed for this alternative. An average trucking distance was used to determine the unit cost.

Hydraulic Dredging

This alternative consists of utilizing hydraulic dredging equipment to remove sediment from the lake. The sediment would be pumped into geotubes at one of three laydown areas (Mars, County Site, and Bull Pen). The geotubes are used due to minimal space available for sediment basins. Geotubes act as large filters allowing the dredge water to pass through but keeping the sediment intact. A hanging bag test was performed to determine the adequate drying time for the sediment in the geotubes. This drying time along with a layout of the geotubes and a hydraulic dredging evaluation (performed by ERDC) was used to determine a production rate for the dredging operation. This production rate along with crew development was used to determine the unit cost of hydraulic dredging and sediment transportation and placement for this alternative.

TABLE #1
SCREENING LEVEL CONSTRUCTION COST ESTIMATES
October 2004 Cost Level

Alternative	Construction Cost*	\$/CY
Mechanical Sediment Removal – Drain the Lake	\$8,642,000	\$21.34
Mechanical Sediment Removal – No Lake Drainage	\$12,792,000	\$31.59
Hydraulic Dredging	\$10,960,000	\$27.06

* Includes contingencies

Recommended Plan

The screening level cost estimate for the Mechanical Sediment Removal – Drain the Lake alternative, proved to be the most cost effective. However, due to funding restraints on the federal portion of Section 206 projects it is apparent that the entire amount of the dredging could not be performed. As a result the recommended plan was broken into 25% quantity intervals to determine how much of the dredging could be performed.

TABLE #2
INCREMENTAL RECOMMENDED PLAN
 October 2004 Cost Level

% Dredging	Quantity (CY)	Construction Cost*	\$/CY
100%	348,300	\$8,642,000	\$21.34
75%	261,225	\$7,063,000	\$23.25
50%	174,150	\$5,560,000	\$27.46
25%	87,075	\$3,367,000	\$33.25

*Included contingencies

Detailed Construction Cost Estimate Recommended Plan

Upon completion of the screening level cost analysis a more detailed construction estimate was performed on the recommended plan (Mechanical Sediment Removal – Drain the Lake). The construction cost estimate, prepared in MCACES, included detailed breakdowns of equipment, labor, material and supply costs. It also accounted for subcontractor and prime contractor markup's as well as overtime adjustments where necessary.

The estimate was based upon the assumption that the lake would be drained by the sponsor prior to being turned over to an earthwork construction contractor. The lake would be excavated using hydraulic excavators in conjunction with dozers. The trucking of the material was assumed to be subcontracted. It was assumed that the contractor would work double shifts, weather permitting, during the actual dredging portion of the work. This is due to the difficulty associated in excavating a dry lake bed in wet weather. The contractor will need to maximize the amount of production during the dry weather days.

It was determined to lower the contingency to 20% for this estimate due to the increased detail in preparing the cost estimate. The limited details available on the design, quantities, and the amount of unknowns typical for this level of design preclude the contingency from going below the 20% level.

The detailed estimate was broken into increments based upon the amount of material to be dredged. This was done so that when the total project cost was calculated the amount of dredging could be adjusted so that the total cost was under the Federal Cap for this type of work. A separate estimate was performed for each increment. This allowed the excavation and trucking production rates to vary based upon the difference in quantities of material as well as the use of different sediment placement areas by the different increments.

Total Project Cost Estimate

The total project cost estimate consists of the construction cost as well as sunk cost, future design cost, real estate costs, and contingencies. The design cost, construction management, planning and project management costs were based upon a percentage of the construction cost prior to contingency. The real estate cost was based upon appraisals of land value by the Government with an additional in-house labor cost for processing the future land acquisitions. It was assumed that the local sponsor will be responsible for acquiring the land necessary for this project. The following table shows a breakdown of the total project cost estimate by the various codes of accounts (COA). A more detailed breakdown of each individual COA is included later in this appendix.

TABLE #3
TOTAL PROJECT COST BREAKDOWN
October 2004 Cost Level

COA	Description	Cost	Contingency	Total Cost
01	Land and Damages	\$309,000	\$32,000	\$341,000
12	Dredging	\$6,944,000	\$1,698,000	\$8,642,000
22	ERR *Sunk Cost	\$1,050,000	\$0	\$1,050,000
30	Planning, Engineering and Design	\$695,000	\$170,000	\$865,000
31	Construction Management	\$521,000	\$127,000	\$648,000
	Totals	\$9,519,000	\$2,027,000	\$11,546,000

Fully Funded Cost Estimate

The final cost estimating task was to take the total project cost and prepare a fully funded cost estimate. The fully funded estimate consists of the total project cost inflated per midpoint dates of various activities included in each individual COA. The inflation rate for COA 12 was taken from the Civil Works Construction Cost Index System (CWCCIS). The other COA's were inflated using a 3% per year inflation factor. The cost level of the individual cost items were considered to be October 2004. The COA's were then inflated to their midpoint based on the inflation rates and the time elapsed from October 2004.

TABLE #4
FULLY FUNDED COST BREAKDOWN
October 2004 Cost Level

COA	Description	October 2004 Total Project Cost Includes Contingencies	Fully Funded Cost Level
01	Land and Damages	\$341,000	\$369,000
12	Dredging	\$8,642,000	\$9,658,000
22	ERR *Sunk Cost	\$1,050,000	\$1,050,000
30	Planning, Engineering and Design	\$865,000	\$931,000
31	Construction Management	\$648,000	\$687,000
	Totals	\$11,546,000	\$12,695,000

In 2006 the local sponsor indicated a preference for the 100% dredging option, which is also the recommended plan as described in the main report. The cost table presented below provides the total cost for this 100% dredging option as well as the fully funded cost updated to April 2006 price levels.

TABLE #5
Total and Fully Funded Cost Breakdown
Updated - April 2006

Account No. and Description	April 2006 Total Project Cost (Includes Contingencies)	Fully Funded Cost Level
01- Lands and Damages	\$784,000	\$803,000
12 – Dredging (100%)	\$8,761,000	\$9,237,000
22 – DPR Sunk Costs	\$1,050,000	\$1,050,000
30 - Planning, Engineering and Design	\$876,000	\$897,000
31 - Construction Management	\$657,000	\$693,000
Total*	\$12,128,000	\$12,680,000